

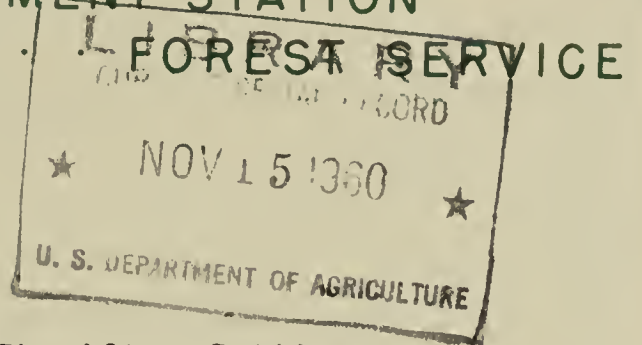
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# TECHNICAL NOTES

LAKE STATES FOREST EXPERIMENT STATION  
U.S. DEPARTMENT OF AGRICULTURE



No. 590

## Two Cases of Wind Damage to Balsam Fir After Cutting

In 1957 a series of pilot plant cuttings were begun in northern Minnesota spruce-fir stands.<sup>1/</sup> The principal objective was to test cutting as a means of controlling damage by the spruce budworm. Since the study was installed, two replications, one near International Falls and another near Grand Marais, experienced severe windstorms. An important consideration in the application of cutting practices in balsam fir stands is the susceptibility of this species to wind damage. The annual examinations of the sample plots for defoliation by the spruce budworm made it possible to pinpoint damage to particular storms, thereby relating damage to known wind velocity.

The timber at each location was about 50 years of age at breast height. Basal defect was relatively low. Each replication was made up of three treatments applied to blocks of 20 to 25 acres each. One block was a commercial clear cut, one was a partial cut, and the third area was left uncut.

The International Falls replication, 12 miles southeast of the airport Weather Bureau station, was cut early in 1957. On May 11, 1959, at 1:00 a.m. a severe storm with winds in excess of 30 miles per hour hit the area and continued until midafternoon on May 12. The wind started blowing from the south-southwest and shifted to the west-northwest. Maximum sustained velocity was 40 m.p.h. with gusts up to 58 m.p.h. Rainfall of 0.49 inch had fallen the day before.

The Grand Marais replication, 7 miles northeast of the U.S. Coast Guard weather station, was cut early in 1958. It is on the Lake Superior side of the continental divide but is about 1000 feet higher than the weather station. A severe storm started at 2:00 a.m. on November 18, 1958, and continued until 1:00 p.m. Sustained winds from the southwest of 64 m.p.h., with gusts up to 70 m.p.h., were recorded. Soil was softened during the 2-day period before the storm by 0.77 inch of rain.

Both storms occurred at a time when overstory hardwoods were not in leaf, so these trees probably offered little protection.

Trees destroyed by the storm were tallied on the 9 to 12 permanent 1/10-acre sample plots for each block. Uprooted and broken trees were not kept separate. Losses are shown in table 1.

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<sup>1/</sup> In cooperation with the Minnesota and Ontario Paper Company and the Superior National Forest.

Table 1.--Balsam fir and spruce loss per acre, by kind of treatment.

Treatment		Number of trees lost:			Basal area loss		
Kind	: Percent : of basal : area cut :	: 4- and : 5-inch : d.b.h. :	: 6 inches : d.b.h. : and up :	: Trees 4 : inches d.b.h. : and up : (sq. ft.)	: Percent : of all : species :	: Percent of : all spruce : and fir	

INTERNATIONAL FALLS

Check	0	0	4.4	1.48	1.5	2.2
Partial cut	27	3.0	14.0	5.73	7.4	11.2
Commercial clear cut	65	3.0	1.0	.55	1.9	5.7

GRAND MARAIS

Check	0	5.8	14.2	6.12	7.5	8.9
Partial cut	19	13.6	<u>1</u> /28.2	9.60	9.0	17.7
Commercial clear cut	43	<u>2</u> /29.0	<u>1</u> /23.0	8.30	10.2	34.9

1/ Includes 4.5 trees per acre of white spruce.

2/ Includes 1.0 tree per acre of white spruce.

In the uncut and partial-cut blocks the trees lost were principally balsam fir in the larger diameter classes. Those less than 6 inches d.b.h. made up the majority of trees lost in the commercial clear-cut blocks. The partial-cut block near International Falls suffered the highest loss on the west side, which had been exposed by adjacent cutting.

Any increased yields that might have been realized in these stands through partial cutting were probably lost by wind damage. However, this type of cutting may still be justified if damage by the spruce budworm is sufficiently reduced to offset the losses from wind. Continued observation will provide data on this problem.

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